

Development of ion injection into the BNL test electron beam ion source using a prototype low energy beam transfer switchyard and a hollow cathode ion source (abstract)^{a),b)}

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In order to provide a variety of ion species to the BNL relativistic heavy ion collider (RHIC) and NASA Space Radiation Laboratory facilities on a pulse-to-pulse basis, the BNL RHIC electron beam ion source (EBIS) will use injection of primary “seed” ions from external low charged ion sources. As part of the prototype for the RHIC EBIS low energy beam transport line, a switchyard for seed ion injection and extracted EBIS ion beams has been constructed. The ion injection line includes a hollow cathode ion source (HCIS), four quadrupole lenses, a switchyard, gridded lenses, and other deflection optics. The HCIS is based on one obtained from CEA Saclay [B. Visentin *et al.*, Phys. Scr., T **71**, 204 (1997).] and has been used in bench studies in the production of low charged metal and gas ions, as well as in BNL test EBIS injection studies for the production of highly charged ions. The HCIS geometry and extraction optics have been modified to be able to reach the output currents necessary to seed the test EBIS. Ion currents greater than 60 μA Cu^+ and 130 μA Ne^+ have been extracted from the modified HCIS at 12–15 kV and plasma aperture of 1–1.5 mm. The HCIS discharge is initiated by a rf coil and can be operated stably at pulse rates from 1 to 100 Hz. Measurement of the emittance of injector beam before and after the injection switchyard will be provided, as well as results from ion injection into the test EBIS using the new injector configuration. © 2008 American Institute of Physics. [DOI: [10.1063/1.2821595](https://doi.org/10.1063/1.2821595)]

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